

represent a hydrogen atom, a halogen atom, an aliphatic hydrocarbon group having from 1 to 30 carbon atoms, an aromatic hydrocarbon group having from 6 to 30 carbon atoms, an alkoxy group having from 1 to 30 carbon atoms, an aryloxy group having from 6 to 30 carbon atoms, a thioalkoxy group having from 1 to 30 carbon atoms, a thioaryloxy group having from 6 to 30 carbon atoms, an amino group, an amido group, or a carboxyl group, and  $R^1$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^6$  and  $R^7$  may be the same or different, and  $R^1$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^6$  and  $R^7$  may be optionally bonded to each other to form a cyclic structure; Z represents a metal element of Groups 2 to 13; m is an integer, indicating the valency of the metal element Z; and  $R^2$  represents a hydrocarbon group.)

7. (Amended) The catalyst as claimed in claim 1 for copolymerization of olefins and styrenes, wherein at least one of three  $R^1$ 's is an aromatic hydrocarbon group having from 6 to 30 carbon atoms.

8. (Amended) The catalyst as claimed in claim 1 for copolymerization of olefins and styrenes wherein three  $R^1$ 's are all aromatic hydrocarbon groups each, having from 6 to 30 carbon atoms.

9. (Amended) The catalyst as claimed in claim 1 for copolymerization of olefins and styrenes, wherein three  $R^1$ 's are all phenyl groups.

10. (Amended) The catalyst as claimed in claim 1 for copolymerization of olefins and styrenes, wherein  $R^2$  is an alkyl group having at least 2 carbon atoms.

11. (Amended) The catalyst as claimed in claim 4 for copolymerization of olefins and styrenes, wherein Z is aluminium.

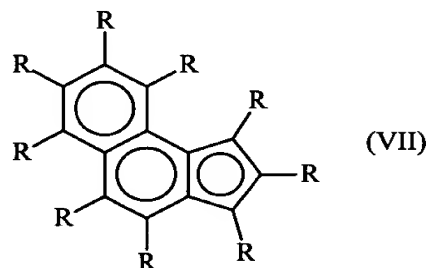
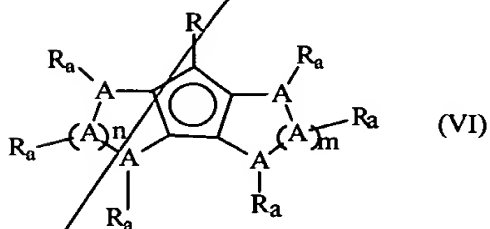
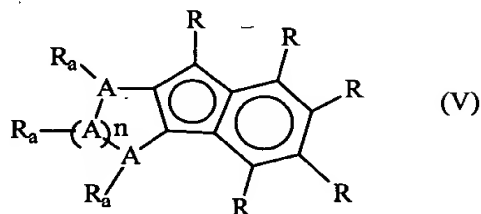
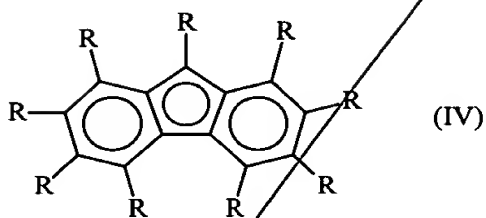
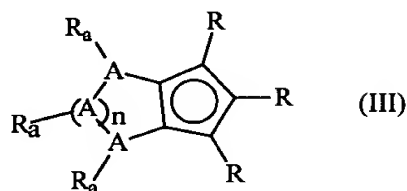
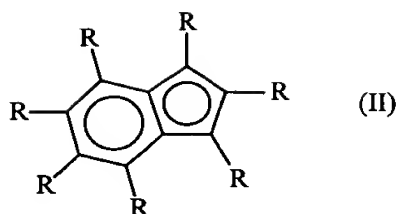
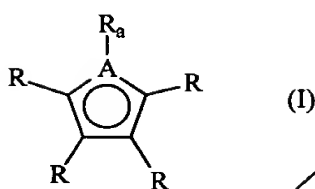
12. (Amended) The catalyst as claimed in claim 1 for copolymerization of olefins and styrenes, wherein the transition metal compound (A) is represented by any of the following general formulae (2) to (6):





in which  $Q^1$  represents a bonding group that crosslinks the two conjugated five-membered cyclic ligands  $(C_5H_{5-a-b}R^8)$  and  $(C_5H_{5-a-c}R^9)$ ;  $Q^2$  represents a bonding group that crosslinks the conjugated five-membered cyclic ligand  $(C_5H_{5-a-d}R^{10})$  and the group  $Z^1$ ;  $R^8$ ,  $R^9$ ,  $R^{10}$  and  $R^{11}$  each represent a hydrocarbon group, a halogen atom, an alkoxy group, a silicon-containing hydrocarbon group, a phosphorus-containing hydrocarbon group, a nitrogen-containing hydrocarbon group, or a boron-containing hydrocarbon group; and a plurality of these groups, if any, may be the same or different, and may be bonded to each other to form a cyclic structure; a represents 0, 1 or 2; b, c and d each represent an integer of from 0 to 5 when a = 0, or an integer of from 0 to 4 when a = 1, or an integer of from 0 to 3 when a = 2; e is an integer of from 0 to 5;  $M^1$  represents a transition metal of Groups 4 to 6 of the Periodic Table;  $M^2$  represents a transition metal of Groups 8 to 10 of the Periodic Table;  $L^1$  and  $L^2$  each represent a coordination-bonding ligand;  $X^1$ ,  $Y^1$ ,  $Z^1$ ,  $W^1$  and  $U^1$  each represent a covalent-bonding or ionic-bonding ligand; and  $L^1$ ,  $L^2$ ,  $X^1$ ,  $Y^1$ ,  $Z^1$ ,  $W^1$  and  $U^1$  may be bonded to each other to form a cyclic structure.

13. (Amended) The catalyst as claimed in claim 1 for copolymerization of olefins and styrenes, wherein, in the transition metal compound (A) of formula (4), the group  $(C_5H_{5-e}R^{11})$  is represented by any of the following general formulae (I) to (VII):



wherein A represents an element of Group 13, 14, 15 or 16, and plural A's may be the same or different; R represents a hydrogen atom, a halogen atom, an aliphatic hydrocarbon group having from 1 to 30 carbon atoms, an aromatic hydrocarbon group having from 6 to 30 carbon atoms, an alkoxy group having from 1 to 30 carbon atoms, an aryloxy group having from 6 to 30 carbon atoms, a thioalkoxy group having from 1 to 30 carbon atoms, a thioaryloxy group having from 6 to 30 carbon atoms, an amino group, an amido group, a

carboxyl group, or an alkylsilyl or alkylsilylalkyl group having from 3 to 30 carbon atoms, and R's may be the same or different, and may be optionally bonded to each other to form a cyclic structure; a represents 0, 1 or 2; and n and m each represent an integer of at least 1.

14. (Amended) A method for producing olefin-styrene copolymers, which comprises polymerizing olefins and styrenes in the presence of the copolymerization catalyst of claim 1.

Please add new Claims 15-39.

15. (New) The catalyst as claimed in claim 2 for copolymerization of olefins and styrenes, wherein, in (C), X is carbon, Y is oxygen and Z is aluminium.

16. (New) The catalyst as claimed in claim 2 for copolymerization of olefins and styrenes, wherein the compound (C) is a reaction product of <1> at least one selected from compounds of a general formula,  $(R^1)_3-C-OR^3$ ,  $R^4-CO-R^5$  or  $R^6-CO-OR^7$ , with <2> a compound of a general formula,  $Z(R^2)_m$ . (In these formulae,  $R^1$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^6$  and  $R^7$  each represent a hydrogen atom, a halogen atom, an aliphatic hydrocarbon group having from 1 to 30 carbon atoms, an aromatic hydrocarbon group having from 6 to 30 carbon atoms, an alkoxy group having from 1 to 30 carbon atoms, an aryloxy group having from 6 to 30 carbon atoms, a thioalkoxy group having from 1 to 30 carbon atoms, a thioaryloxy group having from 6 to 30 carbon atoms, an amino group, an amido group, or a carboxyl group, and  $R^1$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^6$  and  $R^7$  may be the same or different, and  $R^1$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^6$  and  $R^7$  may be optionally bonded to each other to form a cyclic structure; Z represents a metal element of Groups 2 to 13; m is an integer, indicating the valency of the metal element Z; and  $R^2$  represents a hydrocarbon group.)

17. (New) The catalyst as claimed in claim 2 for copolymerization of olefins and styrenes, wherein at least one of three  $R^1$ 's is an aromatic hydrocarbon group having from 6 to 30 carbon atoms.

18. (New) The catalyst as claimed in claim 5 for copolymerization of olefins and styrenes, wherein at least one of three R<sup>1</sup>'s is an aromatic hydrocarbon group having from 6 to 30 carbon atoms.

19. (New) The catalyst as claimed in claim 6 for copolymerization of olefins and styrenes, wherein at least one of three R<sup>1</sup>'s is an aromatic hydrocarbon group having from 6 to 30 carbon atoms.

20. (New) The catalyst as claimed in claim 2 for copolymerization of olefins and styrenes, wherein three R<sup>1</sup>'s are all aromatic hydrocarbon groups each having from 6 to 30 carbon atoms.

21. (New) The catalyst as claimed in claim 5 for copolymerization of olefins and styrenes, wherein three R<sup>1</sup>'s are all aromatic hydrocarbon groups each having from 6 to 30 carbon atoms.

22. (New) The catalyst as claimed in claim 6 for copolymerization of olefins and styrenes, wherein three R<sup>1</sup>'s are all aromatic hydrocarbon groups each having from 6 to 30 carbon atoms.

23. (New) The catalyst as claimed in claim 2 for copolymerization of olefins and styrenes, wherein three R<sup>1</sup>'s are all phenyl groups.

24. (New) The catalyst as claimed in claim 5 for copolymerization of olefins and styrenes, wherein three R<sup>1</sup>'s are all phenyl groups.

25. (New) The catalyst as claimed in claim 6 for copolymerization of olefins and styrenes, wherein three R<sup>1</sup>'s are all phenyl groups.

26. (New) The catalyst as claimed in claim 2 for copolymerization of olefins and styrenes, wherein R<sup>2</sup> is an alkyl group having at least 2 carbon atoms.

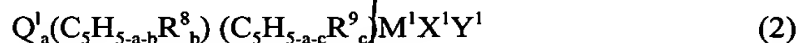
27. (New) The catalyst as claimed in claim 5 for copolymerization of olefins and styrenes, wherein R<sup>2</sup> is an alkyl group having at least 2 carbon atoms.

28. (New) The catalyst as claimed in claim 6 for copolymerization of olefins and styrenes, wherein R<sup>2</sup> is an alkyl group having at least 2 carbon atoms.

29. (New) The catalyst as claimed in claim 5 for copolymerization of olefins and styrenes, wherein Z is aluminium.

30. (New) The catalyst as claimed in claim 6 for copolymerization of olefins and styrenes, wherein Z is aluminium.

31. (New) The catalyst as claimed in claim 2 for copolymerization of olefins and styrenes, wherein the transition metal compound (A) is represented by any of the following general formulae (2) to (6):



in which Q<sup>1</sup> represents a bonding group that crosslinks the two conjugated five-membered cyclic ligands (C<sub>5</sub>H<sub>5-a-b</sub>R<sup>8</sup><sub>b</sub>) and (C<sub>5</sub>H<sub>5-a-c</sub>R<sup>9</sup><sub>c</sub>); Q<sup>2</sup> represents a bonding group that crosslinks the conjugated five-membered cyclic ligand (C<sub>5</sub>H<sub>5-a-d</sub>R<sup>10</sup><sub>d</sub>) and the group Z<sup>1</sup>; R<sup>8</sup>, R<sup>9</sup>, R<sup>10</sup> and R<sup>11</sup> each represent a hydrocarbon group, a halogen atom, an alkoxy group, a silicon-containing hydrocarbon group, a phosphorus-containing hydrocarbon group, a nitrogen-containing hydrocarbon group, or a boron-containing hydrocarbon group; and a plurality of these groups, if any, may be the same or different, and may be bonded to each other to form a cyclic structure; a represents 0, 1 or 2; b, c and d each represent an integer of from 0 to 5 when a = 0, or an integer of from 0 to 4 when a = 1, or an integer of from 0 to 3 when a = 2; e is an integer of from 0 to 5; M<sup>1</sup> represents a transition metal of Groups 4 to 6 of the Periodic Table; M<sup>2</sup> represents a transition metal of Groups 8 to 10 of the Periodic Table; L<sup>1</sup> and L<sup>2</sup> each

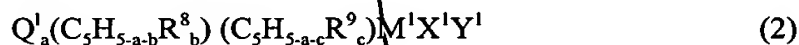
represent a coordination-bonding ligand;  $X^1$ ,  $Y^1$ ,  $Z^1$ ,  $W^1$  and  $U^1$  each represent a covalent-bonding or ionic-bonding ligand; and  $L^1$ ,  $L^2$ ,  $X^1$ ,  $Y^1$ ,  $Z^1$ ,  $W^1$  and  $U^1$  may be bonded to each other to form a cyclic structure.

32. (New) The catalyst as claimed in claim 5 for copolymerization of olefins and styrenes, wherein the transition metal compound (A) is represented by any of the following general formulae (2) to (6):



in which  $Q^1$  represents a bonding group that crosslinks the two conjugated five-membered cyclic ligands  $(C_5H_{5-a-b}R^8_b)$  and  $(C_5H_{5-a-c}R^9_c)$ ;  $Q^2$  represents a bonding group that crosslinks the conjugated five-membered cyclic ligand  $(C_5H_{5-a-d}R^{10}_d)$  and the group  $Z^1$ ;  $R^8$ ,  $R^9$ ,  $R^{10}$  and  $R^{11}$  each represent a hydrocarbon group, a halogen atom, an alkoxy group, a silicon-containing hydrocarbon group, a phosphorus-containing hydrocarbon group, a nitrogen-containing hydrocarbon group, or a boron-containing hydrocarbon group; and a plurality of these groups, if any, may be the same or different, and may be bonded to each other to form a cyclic structure; a represents 0, 1 or 2; b, c and d each represent an integer of from 0 to 5 when a = 0, or an integer of from 0 to 4 when a = 1, or an integer of from 0 to 3 when a = 2; e is an integer of from 0 to 5;  $M^1$  represents a transition metal of Groups 4 to 6 of the Periodic Table;  $M^2$  represents a transition metal of Groups 8 to 10 of the Periodic Table;  $L^1$  and  $L^2$  each represent a coordination-bonding ligand;  $X^1$ ,  $Y^1$ ,  $Z^1$ ,  $W^1$  and  $U^1$  each represent a covalent-bonding or ionic-bonding ligand; and  $L^1$ ,  $L^2$ ,  $X^1$ ,  $Y^1$ ,  $Z^1$ ,  $W^1$  and  $U^1$  may be bonded to each other to form a cyclic structure.

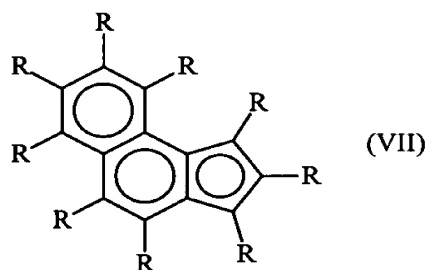
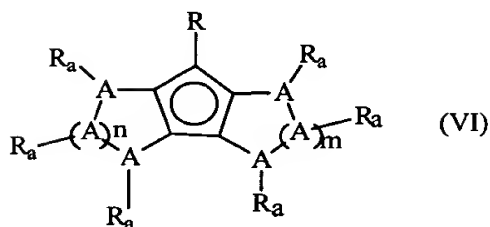
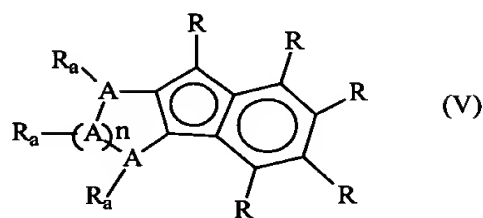
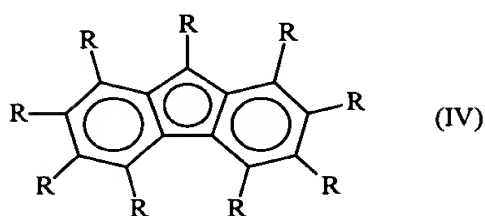
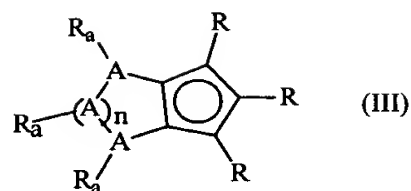
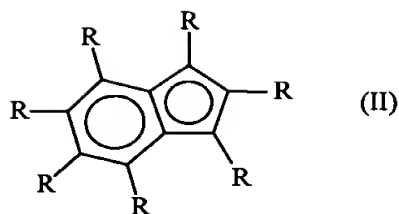
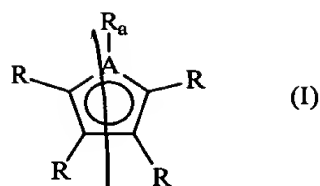
33. (New) The catalyst as claimed in claim 6 for copolymerization of olefins and styrenes, wherein the transition metal compound (A) is represented by any of the following general formulae (2) to (6):



in which  $Q^1$  represents a bonding group that crosslinks the two conjugated five-membered cyclic ligands  $(C_5H_{5-a-b}R^8_b)$  and  $(C_5H_{5-a-c}R^9_c)$ ;  $Q^2$  represents a bonding group that crosslinks the conjugated five-membered cyclic ligand  $(C_5H_{5-a-d}R^{10}_d)$  and the group  $Z^1$ ;  $R^8$ ,  $R^9$ ,  $R^{10}$  and  $R^{11}$  each represent a hydrocarbon group, a halogen atom, an alkoxy group, a silicon-containing hydrocarbon group, a phosphorus-containing hydrocarbon group, a nitrogen-containing hydrocarbon group, or a boron-containing hydrocarbon group; and a plurality of these groups, if any, may be the same or different, and may be bonded to each other to form a cyclic structure; a represents 0, 1 or 2; b, c and d each represent an integer of from 0 to 5 when a = 0, or an integer of from 0 to 4 when a = 1, or an integer of from 0 to 3 when a = 2; e is an integer of from 0 to 5;  $M^1$  represents a transition metal of Groups 4 to 6 of the Periodic Table;  $M^2$  represents a transition metal of Groups 8 to 10 of the Periodic Table;  $L^1$  and  $L^2$  each represent a coordination-bonding ligand;  $X^1$ ,  $Y^1$ ,  $Z^1$ ,  $W^1$  and  $U^1$  each represent a covalent-bonding or ionic-bonding ligand; and  $L^1$ ,  $L^2$ ,  $X^1$ ,  $Y^1$ ,  $Z^1$ ,  $W^1$  and  $U^1$  may be bonded to each other to form a cyclic structure.

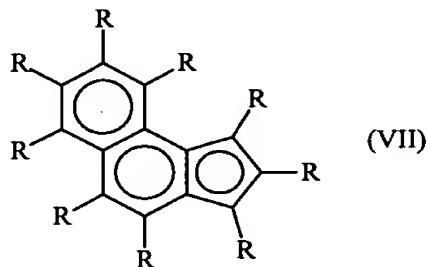
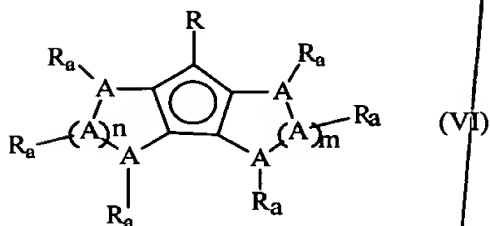
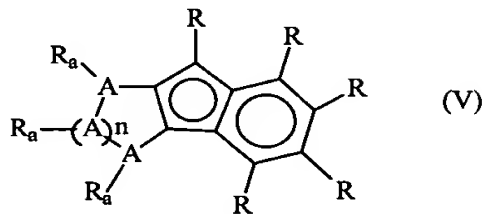
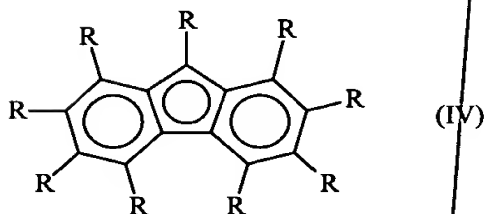
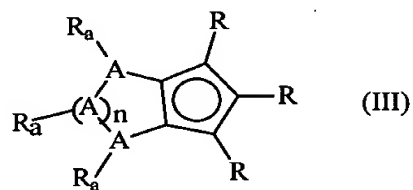
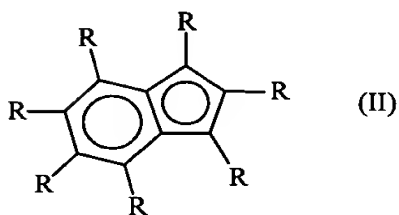
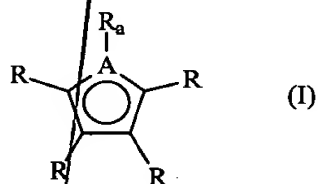
34. (New) The catalyst as claimed in claim 2 for copolymerization of olefins and styrenes, wherein, in the transition metal compound (A) of formula (4), the group  $(C_5H_{5-e}R^{11}_e)$  is represented by any of the following general formulae (I) to (VII):





wherein A represents an element of Group 13, 14, 15 or 16, and plural A's may be the same or different; R represents a hydrogen atom, a halogen atom, an aliphatic hydrocarbon group having from 1 to 30 carbon atoms, an aromatic hydrocarbon group having from 6 to 30 carbon atoms, an alkoxy group having from 1 to 30 carbon atoms, an aryloxy group having from 6 to 30 carbon atoms, a thioalkoxy group having from 1 to 30 carbon atoms, a thioaryloxy group having from 6 to 30 carbon atoms, an amino group, an amido group, a carboxyl group, or an alkylsilyl or alkylsilylalkyl group having from 3 to 30 carbon atoms, and R's may be the same or different, and may be optionally bonded to each other to form a cyclic structure; a represents 0, 1 or 2; and n and m each represent an integer of at least 1.

35. (New) The catalyst as claimed in claim 5 for copolymerization of olefins and styrenes, wherein, in the transition metal compound (A) of formula (4), the group  $(C_5H_5R^{11})_e$  is represented by any of the following general formulae (I) to (VII):



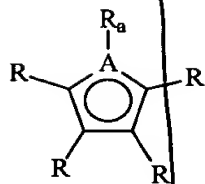
wherein A represents an element of Group 13, 14, 15 or 16, and plural A's may be the same or different; R represents a hydrogen atom, a halogen atom, an aliphatic hydrocarbon group

having from 1 to 30 carbon atoms, an aromatic hydrocarbon group having from 6 to 30 carbon atoms, an alkoxy group having from 1 to 30 carbon atoms, an aryloxy group having from 6 to 30 carbon atoms, a thioalkoxy group having from 1 to 30 carbon atoms, a thioaryloxy group having from 6 to 30 carbon atoms, an amino group, an amido group, a carboxyl group, or an alkylsilyl or alkylsilylalkyl group having from 3 to 30 carbon atoms, and R's may be the same or different, and may be optionally bonded to each other to form a cyclic structure; a represents 0, 1 or 2; and n and m each represent an integer of at least 1.

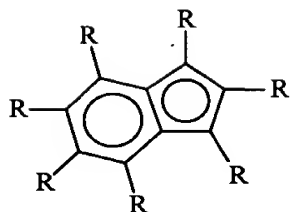
36. (New) The catalyst as claimed in claim 6 for copolymerization of olefins and styrenes, wherein, in the transition metal compound (A) of formula (4), the group  $(C_5H_5)_e R^{11}_c$  is represented by any of the following general formulae (I) to (VII):

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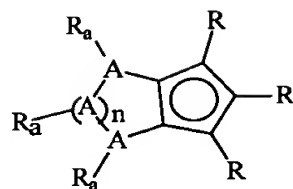
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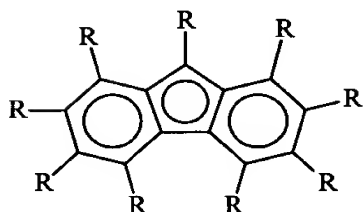
(I)



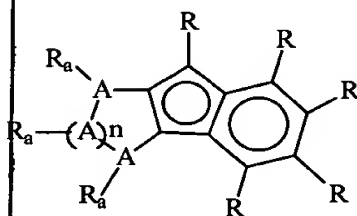
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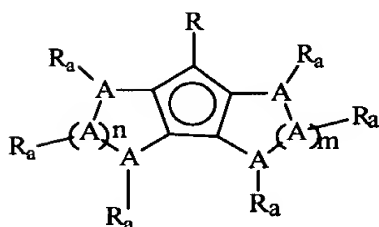
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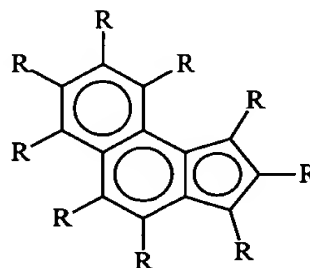
(IV)



(V)



(VI)



(VII)

wherein A represents an element of Group 13, 14, 15 or 16, and plural A's may be the same or different; R represents a hydrogen atom, a halogen atom, an aliphatic hydrocarbon group having from 1 to 30 carbon atoms, an aromatic hydrocarbon group having from 6 to 30 carbon atoms, an alkoxy group having from 1 to 30 carbon atoms, an aryloxy group having

from 6 to 30 carbon atoms, a thioalkoxy group having from 1 to 30 carbon atoms, a thioaryloxy group having from 6 to 30 carbon atoms, an amino group, an amido group, a carboxyl group, or an alkylsilyl or alkylsilylalkyl group having from 3 to 30 carbon atoms, and R's may be the same or different, and may be optionally bonded to each other to form a cyclic structure; a represents 0, 1 or 2; and n and m each represent an integer of at least 1.

37. (New) A method for producing olefin-styrene copolymers, which comprises polymerizing olefins and styrenes in the presence of the copolymerization catalyst of claim 2.

38. (New) A method for producing olefin-styrene copolymers, which comprises polymerizing olefins and styrenes in the presence of the copolymerization catalyst of claim 5.

39. (New) A method for producing olefin-styrene copolymers, which comprises polymerizing olefins and styrenes in the presence of the copolymerization catalyst of claim 6.